Docket No. P6144 Firm No. 0045.0021

WHAT IS CLAIMED IS:

1	1. A method for generating a user interface, wherein an application program
2	processes data and generates application output and wherein a user interface module processes
3	the application output to generate output data to render on an output device, comprising:
4	generating output data, with the user interface module, to render on the output device in
5	response to processing statements in the user interface module;
6	reaching a processing point, with the user interface module, where the user interface
7	module does not include statements to generate output data;
8	receiving, with the user interface module, an interaction object from the application
9	program specifying data after reaching the processing point; and
10	generating output data to render on the output device from the interaction object.

- 2. 1 The method of claim 1, wherein the interaction object further includes attribute 2 information indicating characteristics of the data to output, wherein the output data is rendered 3 in a format corresponding to the characteristics indicated in the attribute information.
- 1 3. The method of claim 1, wherein the user interface module comprises a 2 Controller and View and the application program comprises a Model conforming to the Model View Controller architecture. 3
- 1 4. The method of claim 3, wherein the Controller includes the statements that are 2 processed to generate output data, further comprising: 3 requesting, with the Controller, the interaction object from the Model upon reaching the 4 processing point; and
- 5 transferring, with the Controller, the received interaction object to the View, wherein 6 the View generates the output data to render from the interaction object.



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1	5. The method of claim 4, wherein the output data generated by the Model	
2	includes questions, further comprising:	
3	receiving, with the View, user input in response to the presented questions;	
4	adding, with the View, the received user input to the interaction object including the	
5	output data generated by the View; and	
6	returning the interaction object including the received user input to the Model to	
7	process.	

- 6. The method of claim 5, wherein returning the interaction object including the received user input to the Model further comprises:
- transmitting, with the View, the interaction object including the answers to the
- 4 Controller; and
- transferring, with the Controller, the Interaction Object including the received user input to the Model.
- 7. The method of claim 1, wherein multiple user interface modules are capable of generating output data from the interaction object, wherein each user interface module generates the output data to render in a different format.
- 1 8. The method of claim 7, wherein each user interface module generates the output data to render on a different type of output device.
- 1 9. The method of claim 1, further comprising:
- 2 continuing to generate, with the user interface module, output data in response to
- 3 processing statements in the user interface module after the output data generated from the
- 4 interaction object is rendered on the output device.

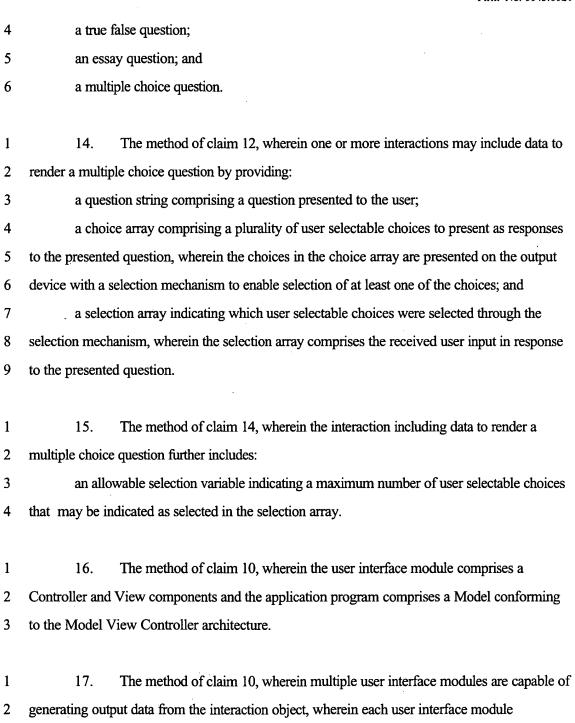




1 10. A method for generating a user interface, wherein an application program 2 processes data and generates application output and wherein a user interface module processes 3 the application output to generate output data to render on an output device by: 4 generating output data to render on the output device in response to processing 5 statements in the user interface module; receiving an interaction object from the application program specifying data to generate 6 7 as output data; 8 generating output data to render on the output device from the interaction object from 9 the data specified in the interaction object; receiving user input in response to the output data rendered on the output device from 10 11 the interaction object; 12 adding the received user input into the interaction object; and returning the interaction object including the received user input to the application 13 14 program.

- 1 11. The method of claim 10, wherein the interaction object further specifies 2 attribute information, wherein the output data is rendered on the output device in a format that 3 corresponds to the specified attribute information.
- 1 12. The method of claim 10, wherein the interaction object comprises a plurality of 2 interactions, wherein each interaction includes data to cause the user interface module to render 3 a message or question on the output device.
- 1 13. The method of claim 12, wherein each interaction is capable of providing 2 information to cause the user interface module to generate a question that is a member of a set 3 of questions comprising:



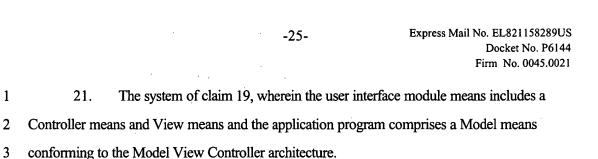


generates the output data to render in a different format.

attribute information.

1	18. The method of claim 17, wherein each user interface module generates the		
2	output data from the interaction object to render on a different type of output device.		
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1	19. A system for generating a user interface on an output device, comprising:		
2	a computer readable medium;		
3	an application program means for processing data and generating application output;		
4	an interaction object included in the computer readable medium specifying data to		
5	generate, wherein the application program means generates the interaction object; and		
6	a user interface module means for generating output data to render on the output device		
7	by performing:		
8	(i) processing statements in the user interface module to generate output data to		
9	render on the output device;		
0	(ii) reaching a processing point where the user interface module does not		
1	include statements to generate output data;		
12	(iii) receiving an interaction object from the application program specifying data		
13	after reaching the processing point; and		
14	(iv) generating output data to render on the output device from the interaction		
15	object.		
1	20. The system of claim 19, wherein the interaction object further includes attribute		
2	information indicating characteristics of the data to output, wherein the user interface module		
3	means renders the output data in a format corresponding to the characteristics indicated in the		





- 1 22. The system of claim 21, wherein the Controller means includes the statements
 2 that are processed to generate output data, wherein the Controller means further performs:
 3 requesting the interaction object from the Model upon reaching the processing point;
 4 and
 5 transferring the received interaction object to the View, wherein the View generates the
 6 output data to render from the interaction object.
- The system of claim 22, wherein the output data generated by the Model means includes questions, wherein the View means further performs:

 receiving user input in response to the presented questions;

 adding the received user input to the interaction object including the output data generated by the View; and

 returning the interaction object including the received user input to the Model to process.
- 1 24. The system of claim 23, wherein returning the interaction object including the
 2 received user input to the Model is performed by:
 3 transmitting, with the View means, the interaction object including the answers to the
 4 Controller; and
 5 transferring, with the Controller means, the Interaction Object including the received
 6 user input to the Model.

1	25. The system of claim 19, further comprising: multiple user interface module		
2	means capable of generating output data from the interaction object, wherein each user		
3	interface module means generates the output data to render in a different format.		
1	26. The system of claim 25, wherein each user interface module generates the		
2	output data to render on a different type of output device.		
1	27. The system of claim 19, wherein the user interface module means further		
2	performs:		
3	continuing to generate, with the user interface module, output data in response to		
4	processing statements in the user interface module after the output data generated from the		
5	interaction object is rendered on the output device.		
1	28. A system for generating a user interface on an output device, comprising:		
2	a computer readable medium;		
3	an application program means for processing data and generating application output;		
4	an interaction object included in the computer readable medium specifying data to		
5	generate, wherein the application program means generates the interaction object; and		
6	a user interface module means for generating output data to render on the output device		
7	by performing:		
8	(i) receiving the interaction object specifying data to generate as output data;		
9	(i) generating output data to render on the output device from the interaction		
10	object from the data specified in the interaction object;		
11	(ii) receiving user input in response to the output data rendered on the output		
12	device from the interaction object;		
13	(iii) adding the received user input into the interaction object; and		

14		(iv) returning the interaction object including the received user input to the	
application program.			
1	29.	The system of claim 28, wherein the interaction object further specifies attribute	
2	information, who	erein the output data is rendered on the output device in a format that	
3	corresponds to the specified attribute information.		
1	30.	The system of claim 28, wherein the interaction object comprises a plurality of	
2	interactions, wherein each interaction includes data to cause the user interface module means t		
3	render a messag	e or question on the output device.	
1	31.	The system of claim 30, wherein each interaction is capable of providing	
2	information to cause the user interface module means to generate a question that is a member		
3	a set of questions comprising:		
4	a true false question;		
5	an essay question; and		
6	a multiple choice question.		
1	32.	The system of claim 30, wherein one or more interactions may include data to	
2	cause the user interface module means to render a multiple choice question by providing:		
3	a question string comprising a question presented to the user;		
4	a choice array comprising a plurality of user selectable choices to present as responses		
5	to the presented question, wherein the choices in the choice array are presented on the output		
6	device with a selection mechanism to enable selection of at least one of the choices; and		

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render on an output device by:

statements in the user interface module;

7 a selection array indicating which user selectable choices were selected through the 8 selection mechanism, wherein the selection array comprises the received user input in response 9 to the presented question. 1 33. The system of claim 32, wherein the interaction including data to render a 2 multiple choice question further includes: 3 an allowable selection variable indicating a maximum number of user selectable choices that may be indicated as selected in the selection array. 4 1 34. The system of claim 28, wherein the user interface module means comprises a 2 Controller and View components and the application program means comprises a Model 3 conforming to the Model View Controller architecture. 1 35. The system of claim 28, wherein multiple user interface module means are capable of generating output data from the interaction object, wherein each user interface 2 3 module means generates the output data to render in a different format. 1 36. The system of claim 35, wherein each user interface module generates the 2 output data from the interaction object to render on a different type of output device. 1 37. An article of manufacture including code for generating a user interface, wherein

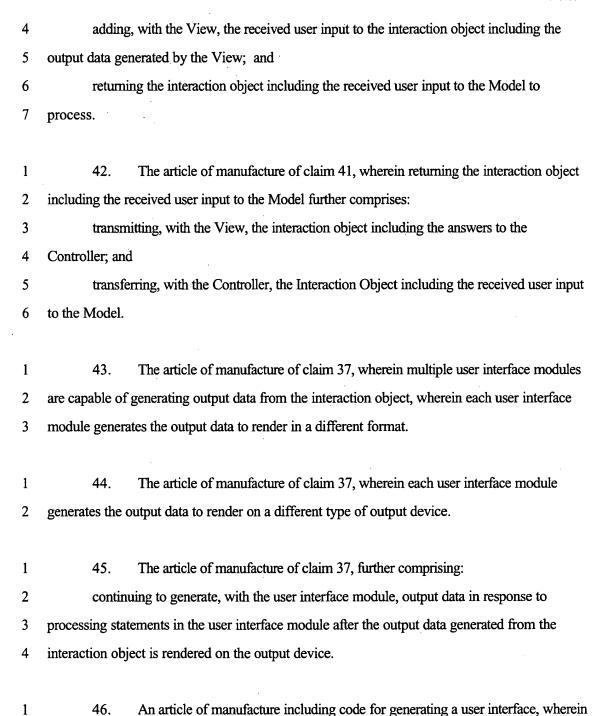
the code includes an application program that processes data and generates application output

generating output data to render on the output device in response to processing

and a user interface module that processes the application output to generate output data to

7 reaching a processing point where the user interface module does not include 8 statements to generate output data; 9 receiving an interaction object from the application program specifying data after 10 reaching the processing point; and 11 generating output data to render on the output device from the interaction object. 1 38. The article of manufacture of claim 37, wherein the interaction object further 2 includes attribute information indicating characteristics of the data to output, wherein the output 3 data is rendered in a format corresponding to the characteristics indicated in the attribute 4 information. 39. The article of manufacture of claim 37, wherein the user interface module 1 2 comprises a Controller and View and the application program comprises a Model conforming 3 to the Model View Controller architecture. 1 40. The article of manufacture of claim 39, wherein the Controller includes the 2 statements that are processed to generate output data, and wherein the Controller further 3 performs: 4 requesting ,the interaction object from the Model upon reaching the processing point; 5 and 6 transferring the received interaction object to the View, wherein the View generates the 7 output data to render from the interaction object. The article of manufacture of claim 40, wherein the output data generated by 1 41. 2 the model includes questions, further comprising:

receiving, with the View, user input in response to the presented questions;



the code includes an application program that processes data and generates application output

3 and a user interface module that processes the application output to generate output data to render on an output device by: 4 5 generating output data to render on the output device in response to processing 6 statements in the user interface module; 7 receiving an interaction object from the application program specifying data to generate 8 as output data; 9 generating output data to render on the output device from the interaction object from 10 the data specified in the interaction object; 11 receiving user input in response to the output data rendered on the output device from 12 the interaction object; 13 adding the received user input into the interaction object; and 14 returning the interaction object including the received user input to the application 15 program.

- 1 47. The article of manufacture of claim 46, wherein the interaction object further 2 specifies attribute information, wherein the output data is rendered on the output device in a 3 format that corresponds to the specified attribute information.
- 1 48. The article of manufacture of claim 46, wherein the interaction object comprises 2 a plurality of interactions, wherein each interaction includes data to cause the user interface 3 module to render a message or question on the output device.
- 1 49. The article of manufacture of claim 48, wherein each interaction is capable of 2 providing information to cause the user interface module to generate a question that is a 3 member of a set of questions comprising: 4 a true false question;

5	an essay question; and		
6	a multiple choice question.		
1	50. The article of manufacture of claim 48, wherein one or more interactions may		
2	include data to cause the user interface module to render a multiple choice question by		
3	providing:		
4	a question string comprising a question presented to the user;		
5	a choice array comprising a plurality of user selectable choices to present as responses		
6	to the presented question, wherein the choices in the choice array are presented on the output		
7	device with a selection mechanism to enable selection of at least one of the choices; and		
8	a selection array indicating which user selectable choices were selected through the		
9	selection mechanism, wherein the selection array comprises the received user input in response		
0	to the presented question.		
1	51. The article of manufacture of claim 46, wherein the interaction including data to		
2	cause the user interface module to render a multiple choice question further includes:		
3	an allowable selection variable indicating a maximum number of user selectable choices		
4	that may be indicated as selected in the selection array.		
1	52. The article of manufacture of claim 46, wherein the user interface module		
2	comprises a Controller and View components and the application program comprises a Model		
3	conforming to the Model View Controller architecture.		
1	53. The article of manufacture of claim 46, wherein multiple user interface modules		
2	are capable of generating output data from the interaction object, wherein each user interface		

3 module generates the output data to render in a different format.

- 1 54. The article of manufacture of claim 53, wherein each user interface module
- 2 generates the output data from the interaction object to render on a different type of output
- 3 device.